THE ROADSIDE CHEMICAL CONTROL PROGRAM IN OHIO

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In Ohio there are 85,450 acres of state parks administered and operated by the Ohio Department of Natural Resources (Conservation) 46,850 acres are water and 38,600 acres are in park land. The state forests contain 153,501 acres; the Division of Wildlife administers 58,663 acres in their program of protection and propagation of wild game and birds in Ohio.

This is not meant to sound like a publicity news release, but to form a basis of comparison of land areas involved when we speak of the roadsides on the rural mileage of Ohio's state and federal highway system. There are 15,745 miles of rural state and federal highways in Ohio with an estimated 76,520 acres of roadsides, nearly twice the land area of the state parks. The Interstate Highway System in Ohio will add 1,568.4 miles, of which 1,331.9 miles will be rural. With right of way 300 feet wide and numerous interchanges, it is estimated this will add in excess of 50,000 acres of roadside. Thus, in 15 years more Ohio roadsides will contain an estimated acreage of over 125,000.

Last year (1960) in Ohio the mowing of roadsides cost $1,815,848.92 combined with $258,981.11 for weed spraying, our vegetation control program totaled $2,074,830.03. How to perform the normal maintenance operations over rapidly expanding facilities without a proportional increase in the budget is the nightmare maintenance engineers are experiencing everywhere.

This group is aware of the functions of the roadsides in highway design and there is no need to defend the acreage involved. The fact is, design engineers are now carefully studying the degree of slop on cuts, fills, ditches, the median cross section, etc., with a view to bringing a vehicle, out of control, to a stop with a minimum of damage to the occupants, without upsetting, or colliding with other vehicles or stationary objects. All of this adds up to even greater widths of median and roadside and more and more acres to maintain.

Perhaps the prevention of erosion is the most important phase of roadside maintenance from the department viewpoint. Erosion, if unchecked, can soon undermine the roadway, the structures, and destroy the drainage system of the highway as well as present a serious safety hazard to the motorist.

It has been known for many years that the establishing of a vegetative cover prevents erosion of the soil, and for thirty years, or more, highway departments have fertilized, seeded with grasses, and mulched the freshly graded roadsides on new construction projects. Unfortunately, this original treatment is often considered, by highway personnel, as adequate to develop and maintain a turf cover forevermore, when quite the opposite is true. Seeding as we do, on sterile subsoils, lacking in organic content and usually one or more of the three basic plant nutrients; add to this, the possibility of inadequate seed bed preparation, seeding at an off-season time, and then the precariousness of the weather, there is little wonder that we have confounded the agronomy people by getting any cover at all. But the point is, our seeding results are not always the best, and those which develop into a thin, weedy, grass stand with a yellowish color will not improve with time, but will rapidly deteriorate. Here is the first place for a Roadside Chemical Control Program—application of fertilizer to sick and ailing roadsides. For about $15.00 you can purchase 450 lbs., in place, of a 12-12-12 liquid com-

mercial fertilizer per acre of roadside. Applied the year following seeding, liquid fertilizer because it can be applied so easily, at $15.00 per acre could be the most important expenditure you will make to insure an erosion-free roadside. This same treatment can be used to advantage in revitalizing the thinning sod on old slopes.

Since the beginning of highway departments, one of the principle summer occupations has been the mowing of weeds. Year in and year out, the same unproductive, time consuming operation. While equipment has advanced from hand scythes and horse drawn mowers to portable power trimmers and complex hydraulically controlled gang mowers, the basic thought of vegetative control by cutting off the tops remains the same.

The fifteen years following World War II have been filled with the most amazing scientific advancements in history. By no means least of those are the achievements in agricultural chemicals, and of particular interest to highway department personnel are the growth control materials. Already the list includes a choice of selective killers, inhibitors and soil sterilants, and improved ones, or ones for more specialized uses are being added each year. One of the first and most widely adopted of these chemicals was 2,4-D and its close relative, 2,4,5-T.

When these synthetic hormone, selective, broad leaf killers were first introduced to the Ohio Department of Highways in 1946, they were accepted as something of a novelty. For several years they were applied with hand spray applicators and their principle benefit in the highway weed program was thought to be on areas of noxious weeds and poison ivy. They were good in public relations, perhaps, for treating a patch of Canadian thistle on the right of way which worred the neighboring farmer, but were used to little other advantage.

By 1950 two schools of thought were developing concerning the material; one that it was an added expense to the weed control costs, of little benefit and should be discarded. The other side had a theory—that if a complete roadside wide application was made, it would reduce the weed population and possibly eliminate the need for a summer mowing required to remove the ragged weed growth which develops during the hot weather while the grasses are more or less dormant.

So this theory was tested in 1951 when all roadsides on the rural state highway in Knox County were sprayed their full width wherever possible without endangering the crops in adjoining fields. Detailed spraying and mowing costs were carefully tabulated and at the end of the season the theory was proven to be true. The combined costs of mowing and spraying averaged approximately $18.00 per mile less than the average cost of mowing per mile for each of the three previous years. Thus on the 184 rural miles in this county the savings amounted to about $3,300.00 by eliminating one or more of the mowings formerly needed.

When this cost savings was shown, the roadside spray program was expanded rapidly in the years to follow. By 1956 we were spraying 11,500 miles of the rural highways in Ohio and have maintained this rate in the years following. In 1960 we sprayed 11,812.43 miles. The combined cost of spraying and mowing averaged $124.73 per mile, while the cost of mowing the unsprayed roadsides was $159.97 per mile for an indicated savings of $416,144.88 by the 1960 spray program.

Part of the spraying is by contract and part by highway maintenance forces. In 1960, 7,756.64 miles were sprayed by contract, the remaining 4,055.79 miles by maintenance, and we have had about that ratio since contract spraying was started in 1953.

The 1961 contract program is to cover the same routes as last year, but we have completely revised our specifications. Formerly, the pay unit was a mile of highway, including the roadsides on both sides. The minimum rate of application of spray mixture was 120 gallons, 60 gallons to each side. On highways with a grass covered median, the rate was 180 gallons per mile. The contract unit was a county, and the contract was made up of the counties to be sprayed within a highway division. Now naturally, the roadsides vary in width from one highway

to the next, and the specified gallonage per mile would be too much on some and not enough on others, so the specified rate of application was controlled by totalling the gallonage applied and comparing with the gallonage required for the mileage specified in each county. This rate of application is based on the average of 4 acres per mile of highway which was satisfactory until we began adding large sections of wide right of way, limited access multi-lane construction to the system.

So the new specification was adopted and the pay unit changed to gallon of material in place. We now require 30 gallons of mixture applied per acre of roadside. Furthermore, the required capabilities of the equipment are listed in the specification. When areas of right of way lie beyond the limits of the specified sprayer operated from the road surface, the contractor shall be required to use off the road equipment to extend the spraying to all the area to the right of way line. The contract lists the routes or parts of routes in each county to receive the application and the estimated gallonage of material required is listed for the county except that if off the road spraying is required, those routes and gallonages are listed separately from those sprayed from roadway. The several counties within a division are combined and let as one contract.

The strength of mixtures has remained the same. We specify a low volatile ester material containing 4 pounds of acid equivalent per gallon. There are two different mixtures called Application A and Application B. "A" is intended for general weeds and contains 3 quarts of 2,4-D per 100 gallons of water. "B" is for harder to kill weeds, briars and brush and contains 2 quarts of 2,4-D and 1 quart of 2,4,5-T per 100 gallons of water. The treatment is usually for two applications during the season, the first in May and the second in early July, although the actual dates specified are at the discretion of the division and intended to be those dates which can be best coordinated with their mowing program and the farm crops grown in their area. For instance, in a tomato growing region of the State, the first application may be specified for early May before the crop is set in the fields and the second application specified for late August or early September, near the end of the growing season. If there is a brush problem in the county one application of "A" and the other of "B" may be specified. "A" is usually the first and "B" the second.

For best results, we feel the roadside should not be mowed for at least five days before spraying so that no clippings will be lying over the tops of the weeds and there is sufficient foliage on the plant to absorb a lethal dose. Following spraying, there should be at least a five day interval so that the material has adequate time for circulating through the weed and destroying the root.

When a county, not having had previous spraying comes into the program it has been the policy to make three applications a season until it is felt the weeds are under control.

Besides the direct monetary savings which result from weed spraying, we feel there are other benefits.

1. In 1949 Ohio highway employees suffered from 13.25 cases of ivy poisoning per million man hours of possible exposure. By 1959 this was reduced to 4.36 cases per million man hours. There is, we hope, a similar benefit to the public through the reduction of ivy poisoning and eradication of ragweed and other allergy producing weeds along the highways.
2. There is a reduction in the cost of sharpening and repairing mowing equipment. Several years ago one of the twelve highway divisions estimated this to be $3,000.00 per season for their division.
3. Spraying eliminates much of the need for hand mowing of areas inaccessible to mowing equipment.
4. With the weeds removed from the roadsides, the sod thickens and gives better protection against erosion.
5. Available labor is released from mowing to work on the summer resurfacing, patching and repair program.

No one should ever speak or write in behalf of a weed spray program without warning of the dangers in the misuse of the material. We are of the belief that 2,4-D and 2,4,5-T are non-poisonous to animals of all kinds, and have strongly defended this position. We are very grateful for the support we have had through the years from the Diagnostic Lab, Division of Animal Industry, of the Ohio Department of Agriculture. The doctors and technicians of this laboratory have made many examinations in the field, autopsies, and laboratory tests of animals purported to be ill or have died as a result of spraying. They have conducted experiments on healthy animals at the laboratory by the applications of excessive amounts of the chemicals, externally, internally, through drinking water, through feed and on heavily sprayed pastures on which the animals were forced to graze. At no time, and on no claim has illness or death of an animal been found attributable to the chemicals or as a result of spraying.

The misapplication, drift, or volatilization of the material and damage to other than the intended plants is another matter, for the chemical is a very potent killer of plant life. Extreme caution must be used in its application. For this reason we advise the divisions each year to use only the most alert, competent workmen in the spray program. We recommend that the men to take part be brought together in division headquarters and the "do's and don'ts" and "aims and purposes" of the program be thoroughly reviewed with them in a half day session. Near the end of the program a quiz is usually held and the answers reviewed so that each man leaves with as clear a picture as possible as to what is recommended and expected of him. These schools are for the persons who will be on the maintenance spray crews, or inspectors on contract spraying. An inspector rides on each of the contractor's spray rigs—selected because he is is also familiar with the roads in the county. Whether the spraying is by maintenance or contract the instructions are the same—no spraying on either side of the roads bordering homes, vegetable gardens or vegetable crops, tobacco, tomatoes, sugar beets or grapes. Also, if the property owner has posted a "Do not spray sign" on the fence bordering his fields, the owner's wishes are to be respected and the roadside not sprayed. Also we maintain in the Central a file of complete reports on each complaint whether it ever develops into a claim or not. This has a dual purpose; by listing the name of the spray operator, he dislikes having his name on the record and tends to be more careful, and if a claim ever develops it keeps it from growing in size over what was originally reported.

The selective broad leaf weed killers, 2,4-D and 2,4,5-T are by no means the only material of value in the highway program. Selective grass killers have their place as well. In the use of dalapon on Johnsongrass, you in Kentucky have had far more experience than we in Ohio. We do have a serious Johnsongrass problem in the southern part of the state, but have made little more than a token effort against it. Many of our good growing bottom lands are badly infested, but we need a concerted attach by farmers, county and state agencies before there is hope of progress in its eradication.

In the field of soil sterilization there are a number of materials available and a definite place for them on the highways. Our feeling is that the sterilization of a 24 to 30 inch strip beneath the guard rail would give a most advantageous use. We have not progressed too far beyond the investigation stage. In 1959 we had a field test of the materials of six manufactures, with a total of 19 chemicals at varying rates and methods of applications. From the tests we determined the most economical rates and narrowed the field to only those which could be applied by spraying. Work with these materials is limited for the present by the lack of availability of equipment for proper highway application. We had one spray bar custom built for us in 1960 and work has been carried on with it in only one division. The spray bar is designed to straddle the guard rail and apply the material simultaneously from both sides in a strictly controlled pattern. Last year we sprayed 47.12 miles of guard rail using two different materials. One was Urox sprayed in fuel oil, the other was a combination of amino triazole and simazine

applied in water. The cost averaged $61.67 per mile of guard rail; $37.08 was for the material, labor and equipment charge was $24.59. We believe it is reasonable to expect the treatment to last well into the second year.

The practices outlined here are presented in the belief that they represent an economical approach to the problem of roadside maintenance. They can result in a safer, more attractive and trouble-free roadside with a reduction in the general cost of "housekeeping", with the saving available for other needed items of improvement in the maintenance program. True, the savings would not be spectacular, savings never are, only a few percentage points, but they would permit a few more miles of resurfacing each year, or the elimination of 2 or 3 more narrow culverts or sharp curves and be very much appreciated by the motorist. Mr. M. J. Rathbone, who is chairman of the American Petroleum Institute as well as President of the Standard Oil Company of New Jersey, said in a recent letter to Jersey stock holders, "If every car (in 1961) traveled just another hundred miles, the consumption of gasoline would rise almost one percent. This would mean only three or four more minutes behind the steering wheel each week for each driver, but it would add up to 10 million more barrels of gasoline consumed in a year." Now the departments would appreciate, very much the 1 percent increase that would result in the motor fuel tax. As highway employees we can play an important role in this for by building and maintaining safer, more attractive highways and, perhaps, coax the motorist to travel a few miles more, to visit Kentucky and Ohio, buy gasoline, increase our tax revenue and give the economy that extra little push that is needed this year.